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REMARKS

The present invention provides isolated polynucleotides having a sequence as set forth in SEQ ID NOS:19-27, 37-41, 43, 45, 47, 49, 51, or 53 that encode enzymes with activity as a thermostable phosphatase, and enzymatically active fragments thereof. Vectors and cells containing such isolated polynucleotides and thermostable phosphatases encoded by such polynucleotides are also provided.

Claims 1-12 were pending before this communication. By the present communication, claims 1, 2, 5, 10, and 11 are amended to define Applicants' invention with greater particularity as shown in attached Exhibit A. No new matter is added by the amendments as the new claim language is fully supported by the Specification and original claims. Applicants submit that the claim amendments do not narrow the claims in any way within the meaning of Festo Corporation v. Shoketsu Kinzoku Kogyo Kabushiki Co. Ltd., a/k/a SMC Corporation and SMC Pneumatics, Inc. 234 F.3d 558, 51 U.S.P.Q. 2d 1959 (Fed. Cir. 2000). Applicants appreciatively acknowledge the allowance of Claim 12. Accordingly, claims 1-12 are currently pending.

The Objections to the claims

Objections have been raised to claims 5, 10 and 11 for allegedly containing informalities. The objections have been addressed as follows:

With respect to the rejection of claim 5 for allegedly having a "period" after (a), in line 11, Applicants respectfully submit that a semicolon occurs in line 11 following (a). However, claim 5 has been amended at line 9 after "GU5L5" by substituting a semicolon for a period. In addition, with respect to the rejection of claim 5 for alleged informality of the recitation of "(a) and (b)", claim 5 has been amended to delete "and (b)".

With respect to the rejection of claims 10 and 11 for alleged informality of the phrase "coded for," claims 10 and 11 have been amended to substitute "encoded" for the phrase "coded for" and claim 11 has been further amended to delete the repetition of "in" in the phrase "set forth in SEQ ID NO."

To overcome the objection to the phrase "at least 30 amino acid residues to the enzyme of (a)" in claims 10(b) and 11 (b), these claims have been amended to replace "to" by "of" in the phrase.

Accordingly, Applicants respectfully submit that any informalities in claims 5, 10 and 11 have been overcome by the above amendments and reconsideration and withdrawal of the objections to the claims is respectfully requested.

The Rejection Under 35 U.S.C. § 112, First Paragraph

Applicants respectfully traverse the rejection of claims 1-11 under 35 U.S.C. § 112, First Paragraph, as containing subject matter for which an enabling disclosure was allegedly not provided in the specification. Applicants disagree with the Examiner's assertion with regard to claims 1-11 that "there is no disclosure of any particular structure to function/activity relationship in the disclosed species" and that "many functionally unrelated DNAs, proteins, host cells and methods are encompassed within the scope of these claims" (Office Action, page 5). Applicants respectfully submit that the invention polynucleotides and enzymes are all required to have a structure/function relationship. As defined by amended claims 1, 2 and 5, the invention polynucleotides are required to encode, be complementary to, or hybridize with, a polynucleotide that encodes a "thermostable phosphatase, or an enzymatically functional fragment thereof." In addition, the invention polynucleotides, as defined by amended claims 1 and 5, are structurally similar because they are required to have 100% to 70% identity with a polynucleotide that encodes the protein of SEQ ID NO:19, the polynucleotide having the sequence of SEQ ID NO:28, or to comprise at least 15 contiguous bases of such a polynucleotide and hybridize thereto. Similarly, the enzymes recited in amended claims 10 and 11 are thermostable phosphatases and are required to have an amino acid sequence at least 70% identical to SEQ ID NO:28 or comprise at least 30 contiguous amino acids of such a sequence.

Therefore, Applicants respectfully submit that the invention polynucleotides and enzymes of claims 1-11 do have a particular structure to function/activity relationship.

Applicants further disagree with the Examiner's assertion in the Office Action (page 7-8) that those of skill in the art would need to know the exact location in the polynucleotide that encodes an enzyme that would be "tolerant" of modification before any mutation or variant with retained enzymatic function could be obtained. Applicants teach that various mutations can be readily made (for example, that result in amino acid substitutions, additions, deletions, fusions and truncations (Specification, page 19, lines 20-29) and the resultant polypeptides can be screened for phosphatase activity. Applicants describe functional assays known in the art for determining whether a particular polypeptide has phosphatase activity. These assays involve testing to determine whether the enzyme removes phosphate groups from organophosphate ester compounds (Specification, page 33, lines 14-17). Furthermore, Applicants teach that determination of whether a compound is 70% or more identical with the sequence of SEQ ID NO:28 is readily obtained by use of a publicly available sequence alignment program, such as BLASTN (Specification, page 19, lines 13-19). Therefore, Applicants respectfully submit that the Specification provides those of skill in the art with description and guidelines for practice of the invention that are commensurate with the scope of amended claims 1-11.

Thus, Applicants respectfully submit that the guidelines provided in the Specification enable those of skill in the art to readily determine polynucleotides and proteins having the desired structure/function relationship without undue experimentation. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of amended claims 1-9 under 35 U.S.C. § 112, First Paragraph.

The Rejection Under 35 U.S.C. § 102(e)

Applicants respectfully traverse the rejection of claims 1, 3, 5, 6, 7, 8, and 9 as allegedly being anticipated under 35 U.S.C. § 102(e) by *Hirschberg et al.* (U.S. Patent No. 5,792,903). Applicants' invention, as defined by amended claims 1 and 5, distinguishes over *Hirschberg* by reciting isolated polynucleotides that encode, or are complementary, to a polynucleotide that encodes, a "thermostable phosphatase, or an enzymatically functional fragment thereof," such as

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the thermostable phosphatase having SEQ ID NO:19. Dependent claims 3, 6, 8 and 9 also distinguish over the Hirschberg polynucleotide by incorporating all elements recited in independent claims 1 and 5.

The Examiner acknowledges that the Hirschberg polynucleotide, which is only 17 base pairs in length (i.e., bp 1506-1522 of SEQ ID NO:1) is found upstream of an open reading frame that encodes a lycopene cyclase. Thus, the Hirschberg polynucleotide does not lie within an open reading frame. The Examiner fails to establish that Hirschberg discloses any isolated polynucleotide that encodes a polypeptide having phosphatase activity. Thus, Applicants respectfully submit that Hirschberg fails to disclose each and every element of amended claims 1 and 5 (and claims 3, 6, 8 and 9 dependent thereon), as would be required to establish anticipation under 35 U.S.C. 102(e). Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Therefore, in view of the above amendments and remarks, it is submitted that the claims are in condition for allowance, and a notice to that effect respectfully is requested. The Examiner is invited to contact Applicants' undersigned representative if there are any questions relating to this application.

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Please charge any additional fees, or make any credits, to Deposit Account No. 50-1355.

Respectfully submitted,

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EXHIBIT A

Version with Markings to Show Changes Made

In the Claims

1. (Amended) An isolated polynucleotide selected from the group consisting of:
 - (a) a polynucleotide encoding [an enzyme] a thermostable phosphatase comprising an amino acid sequence [selected from the group of amino acid sequences] as set forth in SEQ ID NO[S]:28[-36];
 - (b) a polynucleotide which is complementary to the polynucleotide of (a); and
 - (c) a polynucleotide comprising at least 15 contiguous bases of the polynucleotide of (a) [and b]; wherein the polynucleotide encodes a polypeptide having activity as a thermostable phosphatase.

2. (Amended) An isolated polynucleotide selected from the group consisting of:
 - (a) SEQ ID NO[S]:19[-27, 37-41, 43, 45, 47, 49, 51, or 53];
 - (b) SEQ ID NO[S]:19[-27, 37-41, 43, 45, 47, 49, 51 or 53], where T can also be U;and
 - (c) fragments of a) or b) that are at least 15 contiguous bases in length and that will hybridize to DNA which encodes the amino acid sequence of [any of] SEQ ID NO[S]:28[-36, 42, 44, 46, 48, 50, 52, or 54]; wherein the isolated polynucleotide encodes a thermostable phosphatase, or an enzymatically active fragment thereof.

5. (Amended) An isolated polynucleotide encoding a thermostable phosphatase, or an enzymatically active fragment thereof, comprising a polynucleotide having at least 70% identity to a member selected from the group consisting of:
- (a) a polynucleotide encoding an enzyme encoded by the DNA contained in ATCC Deposit No. 97379, wherein said enzyme is obtained from [selected from the group consisting of] Ammonifex degenesii KC4[, Aquifex VF-5, M11TL, Methanococcus igneus KOL5, Thermococcus AED112RA, and Thermococcus celer, Thermococcus CL-2, and Thermococcus GU5L5.];
 - (b) a polynucleotide complementary to the polynucleotide of (a); and
 - (c) a polynucleotide comprising at least 15 contiguous bases of the polynucleotide of (a) [and b]; wherein the polynucleotide has thermostable phosphatase activity.
10. (Amended) [An enzyme] A thermostable phosphatase of which at least a portion is [coded for] encoded by a polynucleotide of claim 1, and which is selected from the group consisting of:
- (a) [an enzyme] a thermostable phosphatase comprising an amino acid sequence which is at least 70% identical to an amino acid sequence [selected from the group of amino acid sequences] as set forth in SEQ ID NO[S]:28[-36] ; and
 - (b) [an enzyme] a thermostable phosphatase which comprises at least 30 contiguous amino acid residues [to] of the enzyme of (a).
11. (Amended) An enzyme of which at least a portion is [coded for] encoded by a polynucleotide of claim 1, and which is selected from the group consisting of:
- (a) [an enzyme] a thermostable phosphatase comprising an amino acid sequence selected from the group of amino acid sequences set forth in SEQ ID NO[S]:28[-36, 42, 44, 46, 48, 50, 52, or 54]; and
 - (b) [an enzyme] a thermostable phosphatase which comprises at least 30 contiguous amino acid residues [to] of the enzyme of (a).